EMS of the Future

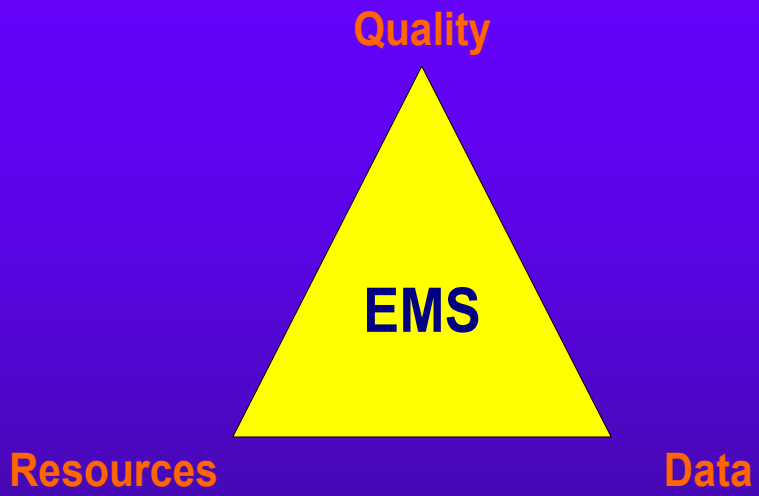
Arizona
EMS Futures Forum
December 5, 2003

Greg Mears, MD
North Carolina EMS Medical Director
University of North Carolina-Chapel Hill

Traits of an Expert

Greg Mears, MD
Associate Professor of Emergency Medicine
NC EMS Medical Director
University of North Carolina-Chapel Hill

Knowledge



- EMS is local
- Quality is the target
  - System
  - Patient
- Data drives Resources
- Resources provide Quality

The Science of EMS

Vision

Dr. Mears is a “Peripheral Visionary”

NC EMS Conference 1997

Leadership

- **“We can’t win at home. We can’t win on the road. As general manager, I just can’t figure out where else to play.”**
  - 1992 Pat Williams, Orlando Magic

Following

His students would follow him anywhere, mainly out of morbid curiosity.

UNC-Chapel Hill 1999

Track Record

Greg Mears, MD FACEP
Associate Professor
North Carolina EMS Medical Director
University of North Carolina-Chapel Hill

Orange County EMS
Expanded Scope System
Welcome to the World Project

National EMS Information System
NHTSA PreHospital Dataset
National EMS Database

The Path to the Future is Lined with the ? of the Past

- Who are we?
- What do we do?
- When do we do it?
- Where did we come from?
- Why did we start?
- How did we get here?

The History of EMS

Military

- Napoleon
  - First to document organized activities in field care
    - Army Chief Surgeon, Jean-Dominique Larrey developed the first triage system
  - First reported air medical evacuation occurred in the 1870's with hot air balloons in Paris during the Prussian siege of the city
  - WWI, WWII, and the Korean War focused on treatment and transport
    - MASH Units
    - Techniques refined in Vietnam conflict

Civilian

- Volunteer Based
  - Funeral Homes
  - Rescue Squads
  - Minimal Training
    - Basic First Aid
    - Transportation

Fire Service

- Began as a service to care for injuries sustained by fire fighters which were later extended to the general public
- Well entrenched into the culture due to property protection issues
- Well established service districts for a quick response

CPR

- Began in early 60's
- Initial defibrillation devices very large, but first defibrillation through the fire service

National Academy of Sciences

- 1966 white paper "Accidental Death and Disability: The Neglected Disease of Modern Society
  - 1st significant look at quality of emergency care to civilians
  - Described the lack of quality care in the field and in ED's
- 1960's began the mobile cardiac care units in Belfast, Ireland by Dr. Pantridge

The First Paramedics

- Initially physician extenders
  - Miami
  - Columbus
  - Portland
  - Los Angeles
- Initially dedicated physicians
  - Mentors
  - Educators
  - Leaders
- Demonstrated that organized systems could work with non-physicians
- Focused on Trauma and Cardiac Care

Emergency

- LA based TV show was the publics first exposure to EMS

911

- 1957 National Association of Fire Chiefs recommended a single number for fire reporting
- 1968 AT&T established 911
  - Brief, easy to remember, quick, unique
- Enhanced 911
  - PSAP (public safety answering point) with caller number and location
  - 85% population has 911 (95% E-911)
  - 50% of geography has 911 (50% E-911)
  - Canada also 911

1973 EMS Enactment vs. 1996 Agenda for the Future

Manpower	Human Resources
Training	Education Systems
Communications	Communication Systems
Transportation	
Facilities	
Critical Care Units	
Public Safety agencies	
Consumer participation	
Access to care	Public Access
Patient transfer	Integration of Health Services
Coordinated patient record keeping	Information Systems
Public information and education	Public Education
Review and evaluation	Evaluation
Disaster plan	
Mutual aid	
	EMS Research
	Legislation and Regulation
	System Finance
	Medical Direction
	Prevention
	Clinical Care

The Playground

- Acute Care
- Non Acute Care
- Disaster Management
- Service Delivery
- Preparedness

- The best EMS systems are only busy 50% of the time.

Variability

- History
- Boundaries
- Jurisdictions
- Geography
- Politics
- Equipment
- Manpower
- Training
- Disaster/Terrorism
- Reimbursement

The Stressors

- Volume
- Volunteerism
- Cost
- Quality
- Quantity
- Focus
- Accountability

EMS 2000

E volution

M utation

S urvival

“One man alone cannot fight the future”

The X-Files Movie

- US SHIP: Please divert your course 0.5 degrees to the South to avoid a collision.
- CND REPLY: Recommend you divert YOUR course 15 degrees to the South to avoid a collision.
- US SHIP: This is the Captain of a US Navy Ship. I say again, divert YOUR course.
- CND REPLY: No. I say again, divert YOUR course!
- US SHIP: THIS IS THE AIRCRAFT CARRIER USS MISSOURI. WE ARE A LARGE WARSHIP OF THE US NAVY. DIVERT YOUR COURSE N O W !!!!!
- CND REPLY: This is a lighthouse. Your call.

- I couldn’t repair your brakes, so I made your horn louder.

Integration of Health Services

- EMS care will be a part of the community health care SYSTEM
  - Information flows in all directions
  - All public safety and health care organizations
- Focus of out-of-facility care
- Community specific
- EMS must expand its role in public health and develop relationships
- Data Collection is key

Orange County Demographics

- ~384 square miles in area
- census population ~112,000
- additional student population ~30,000
- suburban “college town” - Chapel Hill
- rural town - Hillsborough
- large areas of agricultural homesteads

System History

- Two volunteer “rescue squads” organized in late 1960’s
- County-funded daytime paramedics using squad vehicles in mid 1980’s
- County purchased vehicles in early 1990’s - staffed by paid paramedics during daytime, volunteers at night

System History (continued)

- Squads didn't have enough medics to staff all units to ALS level, so service to consumers was unpredictable.
- County EMS Advisory Council (EMSAC) undertook Strategic Planning process.
- EMSAC: *focus on patient outcomes, provide paramedic care to everyone.*

Focus: Patient Outcomes

- Accurate assessment.
- In-field treatment.
- Transport if needed.
- Not a “taxi service.”
- ED is not treatment of choice for all patients.

Accurate assessment and in-field treatment

- Send a paramedic to EVERY incident.
- Provide additional training for medics.
- Empower medics to treat according to their clinical assessment of patients.
- Provide suitable supplies and medical equipment for medics to treat patients.

Transport if needed, but not a “taxi service”

- Separate the paramedic (assessment) from the ambulance (transport).
- Dispatch ambulance only when needed.
- BLS ambulance = BLS transport.
- BLS unit + medic = ALS transport.
- Empower medics to decline transport.

ED is not treatment of choice for all patients - but where?

- Medics are expected to consult with personal care physicians when needed.
- With declination of transport, patient is referred to appropriate facility.
- Family physician, urgent care, telephone nurse advice line.

Initial Response Vehicle (IRV)

Transport Vehicle (ambulance)

Current Configuration

- EMD used to determine who responds.
- All but one FD provide first responders.
- Four to Six medics in IRV's.
- Three or Four BLS transport units.
- Medics zoned to areas, but expected to move around based on system needs.
- Ambulances assigned to fixed stations.

Emergency Medical Dispatch

- The Foundation of our System.
- Response is determined by protocol.
- All Telecommunicators are trained and certified to NAEMD standards.
- Paramedic has authority to adjust recommended response.

“Paramedic Practitioner”

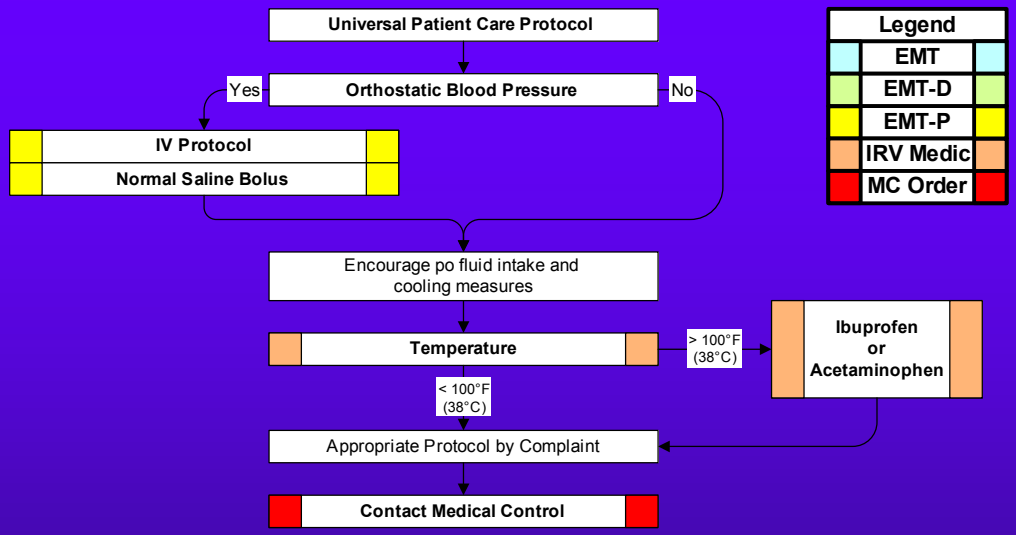
- Seasoned paramedic.
- Advanced assessment training (UNC).
- Non-traditional treatment focus.
- Involved in injury prevention and community health, not just urgent care.
- Operates independently.
- Has little or no on-scene supervision.

Protocols

- Specific algorithms for medics to follow.
- Define what exam is required.
- Define when transport can be declined.
- Allow flexibility in serving patient needs.
- Majority of treatment is standing orders.
- Regularly reviewed and revised.

Fever

History:	Signs and Symptoms:	Differential:
• Age • Duration of fever • Severity of fever • Past medical history • Medications • Immunocompromised (transplant, HIV, diabetes, cancer) • Environmental exposure • Last acetaminophen or ibuprofen	• Warm • Flushed • Sweaty • Chills/Rigors **Associated Symptoms: (Helpful to localize source)** • myalgias, cough, chest pain, headache, dysuria, abdominal pain, mental status changes, rash	• **Infections / Sepsis** • **Cancer / Tumors / Lymphomas** • **Medication or drug reaction** • **Connective tissue disease** **Arthritis** **Vasculitis** • **Hyperthyroid** • **Heat stroke**



Pearls:

- **Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- Febrile seizures are more likely in children with a history of febrile seizures and with a rapid elevation in temperature.
- Temperature may be decreased by a combination of 4 methods:
  - **Radiation:** Heat loss to air (unwrap or remove clothing)
  - **Evaporation:** Heat loss through the evaporation of sweat or liquid from the skin (tepid water bath to skin)
  - **Convection:** Heat loss through the movement of air currents over the skin (increase air movement to skin)
  - **Conduction:** Heat loss through the contact with solid substances (with heat stroke use cool packs per protocol)
- Rehydration with fluids increases the patients ability to sweat and improves heat loss.
- All patients should have drug allergies documented prior to administering pain medications.
- Allergies to NSAID's (non-steroidal anti-inflamatory medications) are a contraindication to Ibuprofen.
- Acetaminophen / Ibuprofen should not be used in the setting of environmental heat emergencies.

Disposition:

EMS Transport:
- **ALS:** Orthostatic patients, pulse oximetry <92% on room air, ALS transport otherwise based on specific protocol.
- **BLS:** No orthostatic changes and pulse oximetry between 92% and 96% on room air.

MD Within 4 Hours: No orthostatic changes and pulse oximetry >96% on room air, unless Paramedic - personal MD consultation dictates otherwise.

Transport System

- Currently under transition
- County has contracted with squad to provide personnel to operate county ambulances; Squad handled personnel, BLS training, and station facilities.
- County provides all equipment & supplies.
- As of June 30, all transport personnel become county employees, and EMS squad only does events (rescue doesn't change).

Benefits of System Design

- Makes best use of limited number of paramedic personnel.
- Driven by patient outcomes.
- Provides good customer service.
- Reduces emergency driving liability.
- Reduces overall system costs.

Drawbacks of System Design

- BLS crews were not well-integrated.
- Limited internal career path (changing).
- Some medics not comfortable “solo.”
- Requires experienced medics, so recruitment and hiring are challenges.
- Different than expectations.

Welcome to the World

- Injury Prevention Program
  - County wide initiative
  - Safe Kids Coalition
  - Integrated with Public Health Department
  - Target Injuries
    - New Born and Preschool

Concept

- Injury Prevention while on Duty
- Leverage Paramedics in cars
- Target Newborns by Birth Certificates
- Visit each home
  - Safety Inspection
  - Educate on County Resources
  - Provide Supplies

Evaluation

- Track Visits
- Monitor EMS System Performance during the visit time
- Monitor Injury Statistics

Results

- We won before we started…….
- Still Ongoing
- Strong Community Support
- Improved Community Relations
- Numbers too small to detect outcomes
- Strong support by Paramedics

What if?

- 911 call for “68 year-old Chest Pain”
- EMS responds “Hot”
- ALS care on scene stabilizes patient
- ALS transport to Hospital
- EMS PCR entered into Information System
- Last day of the month EMS receives payment from CMS without sending a bill?

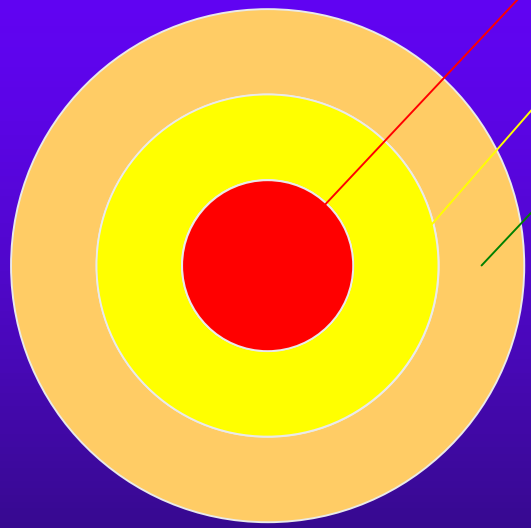
Team

- NASEMSD
  - Project Management
  - Regional Meetings
  - Operational Support
- Greg Mears, MD
  - Principle Investigator
- NEDARC
  - Clay Mann, PhD, Co-Investigator
  - Mike Dean, MD, Co-Investigator
  - Technical Assistance

Data Sources

- National
- State
- Local
- Linkage

National EMS Information System

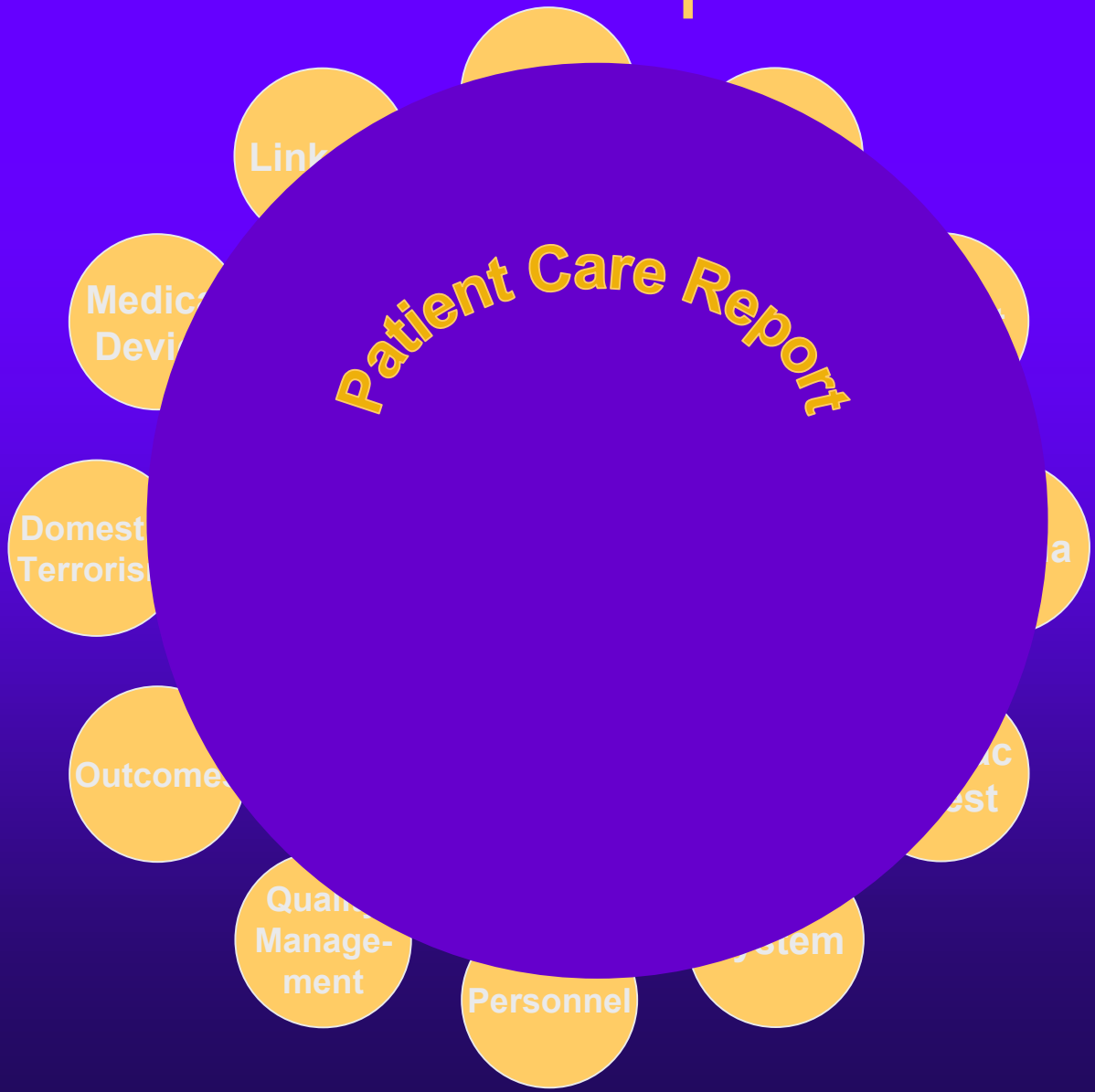


National

State

NHTSA 2.0
(Local)

NEMSIS Components



Another Data Lecture

The Need

- EMS Education
  - Curriculums
  - Local Education
- EMS Outcomes
  - Something other than death
  - System evaluation
- EMS Research
  - Generate hypothesis
  - Evaluate Cost effectiveness
  - Identify problems and target issues
- EMS Reimbursement
  - National fee schedule and reimbursement rates

The NEMSIS Contract

- Revise The NHTSA PreHospital Dataset
- Create a physical database schema with XML linkage
- Define the National EMS Information System Dataset
- Develop potential business models for funding and implementation

Consensus

Professional Organizations

- AAA
- ACEP
- ACS-COT (NTDB)
- AHA (NRCPR)
- EMSOP
- IAFC
- IAFF
- NAEMD
- NAEMSP
- NASEMSD
- NENA

Federal Partners

- CDC
- FEMA
- HRSA-EMSC
- HRSA-EMSC/NEDARC
- HRSA-EMSC/NRC
- HRSA-ORHP
- HRSA-Trauma/EMS
- NHTSA

Assumptions

- EMS Providers are interested in improving prehospital care and public health while reducing errors.
- The collection, aggregation, and analysis of EMS data is good providing it is well defined, safe, confidential and used.
- Linking EMS data with other pertinent data sources will improve the usefulness of the information…..”whole is greater than the sum of the parts”…..

Assumptions continued

- Technology must support the concept.
- Data entry must be automated whenever possible for ease of use and for accuracy
- Confidentiality and privacy of data will be protected.
- EMS agencies must keep records and eventually services seeking reimbursement will be collected electronically
- The process will be lengthy, but is achievable

Local Pulse

- Data collection is important
  - Medical record keeping
  - Local data analysis
  - Decision making
  - Do not detract from patient care
  - Short time frame of documentation

Local: Where we are

- Very little information on local EMS data collection
- Most systems are paper based but are discussing or transitioning to electronic
- Many systems use paper and scan into databases or do manual entry

Local: Where we want to be

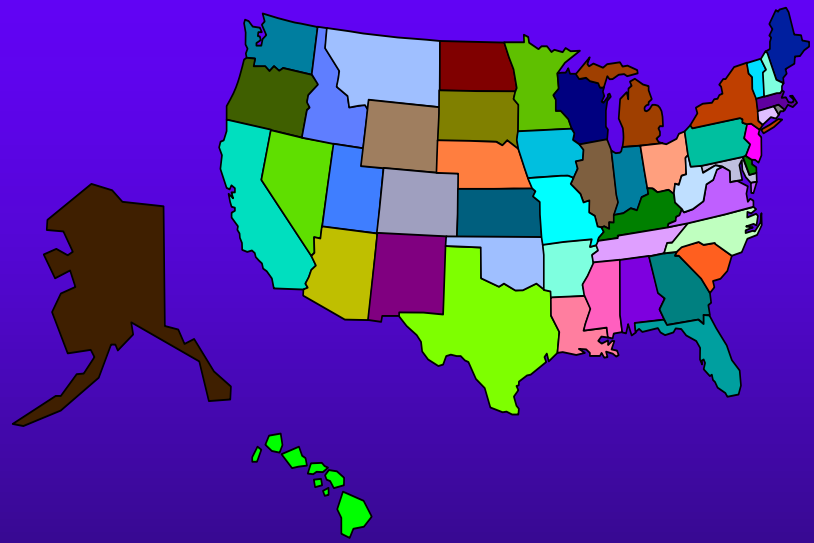
- Electronic data collection
- Uniform dataset with definitions
  - Patient care
  - Technician
  - System
- Workflow oriented
- No dual entry
- Data comes from the source
  - CAD
  - Medical Devices
- The health care components are linked
  - Hospital
  - Dispatch
  - Public Health
  - Public Safety
- Quality Improvement
- Benchmarking
- Community based
- Information is passed to the State office of EMS for finance and policy decisions

Local: How to get there

- Technical Assistance
- Model administrative and/or statutory language
- Standards for data collection and definitions
- Attach to EMS Education Agenda and local training programs
- National job description for EMS providers
- Medical and communication device transmission standards
- National Performance Standards

State Pulse

- There is no data for:
  - Resource planning
  - Budget justification
  - System-wide evaluation
  - Injury prevention programs
  - Target support and assistance



State: Where we want to be

- State EMS database on every EMS patient encounter
- Electronic data transmission
- Privacy and confidentiality protection
  - System and patient
- Statutory authority

State: Where we want to be

- System wide Quality Improvement
- Benchmarking of compliance and public health indicators
- Support and Assistance Resources
- Annual Report for policy makers
- Provide data to the National EMS Database

National Pulse

- Asystole

National: Where we are

- EMS Agenda for the Future
- Monographs, Trade journals
- Surveys

National: Where we want to be

- National EMS Database
- NASEMSD lead the charge
- Revision of the NHTSA Dataset
- Multidisciplinary approach

What will we do with it?

- Public education and drive policy
- Identify national trends
- Benchmarking
- Reduce errors
- Business structure and management
- EMS Research hypothesis
- Promote research
- Outcomes
- Solidify EMS in the Healthcare family
- Drive education
- Prioritize needs and funding
- Determine effectiveness of systems and patient care

Business Model Proposal

- National
- State
- Local

National EMS Database

Needs

- Create
  - Free Standing Database
  - Web Based Reporting
- Maintain
  - Tech Support
  - Ongoing Development
  - Reporting
- Data Movement
  - Import
  - Export
  - Linkage

Issues

- Accept only State data or local data as well (directly)
- Frequency of Submission
  - Monthly
  - Quarterly
- Mandate to submit data?

State EMS Database

Needs

- Method for New States
- Upgrade Existing States
- Data Management
  - Import (Local)
  - Export (National)
- Maintain
  - Tech Support
  - Ongoing Development
  - Reporting

Issues

- Desired Method of Entry
  - Web
  - Free Standing Software
  - Hardware Types
  - Connectivity
  - Security
  - Frequency of Submission
    - Daily
    - Weekly
    - Monthly

Local EMS Database

Needs

- Method for New States
- Upgrade Existing States
- Vendors/Manufacturers Issues and Concerns
- Maintain
  - Tech Support
  - Ongoing Development
  - Reporting
  - Data Management
    - Import (Local)
    - Export (State or ?National)

Issues

- Competition with Vendors
- Fire Reporting Requirements
- Control/Ownership of Data
- Desired Method of Entry
  - Web
  - Free Standing Software
  - Hardware Types
- Connectivity
- Security
- Frequency of Submission
  - Daily vs. Weekly vs. Monthly

Funding

- 5 – 7 Year Implementation
  - National Database Up and Running
  - Data System at each State Level
  - Support at the local level to collect data and send to the State Level

- Currently working on a 3 year plan as well.

Proposed 3 Year Plan

	Yr 1	Yr 2	Yr 3	Ongoing
National Database and Resource Center	500,000	500,000	500,000	Private, Federal or Institutionalized
States and Territories (56)	100,000x56 (5,600,000)	100,000x56 (5,600,000)	100,000x56 (5,600,000)	56 States and Territories
Application Development **1 with National DB only** **1 with Full NHTSA Dataset**	250,000	250,000	250,000	Absorbed By National DB Resource Center
Grand Total	**6,350,000**	**6,350,000**	**6,350,000**	**19,050,000**

Remaining Tasks

- Dataset in Final Draft
  - Final Dataset overview August, 2003
  - Data Dictionary January, 2003
- Schema and XML
  - Draft November, 2003
  - Public Comment Period for 4 weeks
  - Final January, 2003

Where we go from here?

- NASEMSD will recommend state specific datasets from the NEMSIS (NHTSA Version 2) dataset
  - All will move toward the National Data elements as a minimum or floor
- Meeting is planned with the federal partners to discuss the business model and future funding.
  - $250,000 is already allocated for 2003-2004

2003 – 2004 Activity

- Focus on Funding
  - Federal Programs
  - Congressional Line Item
- Pilot National Database
  - 3 states (MN, MS, NC)
  - Proof of Concept with web reporting
- Migrate to Version 2
  - States
  - EMS vendors and software developers

Thank You

What if?

- 911 call for “68 year-old Chest Pain”
- EMS responds “Hot”
- ALS care on scene stabilizes patient
- ALS transport to Hospital
- EMS PCR entered into Information System
- Last day of the month EMS receives payment from CMS without sending a bill?

Key to the Future

- Leadership
  - National
  - State
  - Local
- Healthcare Integration
- Skills
- Medications
- System Design
- Finance
- People
- Patients
- Technology
- Education
- Communication
- DATA

Chain of Survival

Knowledge **Experience** **Wisdom** **Change**

Leadership Role

- What you can MEASURE you Can MANAGE!
- Set realistic goals for yourself and agencies
- **Keep Excellence of Patient Care as the highest priority**
- Know the Difference between PAVLOV and DEMING
- Listen for what is not being Said
- Know your political lifecycles - Internal and External
- Unite, Don't Divide

8 Step Plan for Success

- Listen with your heart
- Don't confuse Management with Leadership
- Treat People as YOU want to be Treated
- See if anyone else has the same problem- (network)
- Take a Field Trip (see if the Grass is Greener)
- SEE Failure not as Defeat - LEARN FROM IT
- Know who the real customer is!
- Always, Thank People for their Time

Contact Information

Greg Mears, MD

gdm@med.unc.edu

www.ncems.org

Success is a journey, not a destination.